

REMARKS/ARGUMENTS

STATUS OF CLAIMS

Applicant has amended Claim 87. Claims 9-19, 36-63, and 72-76 are currently withdrawn, there being no allowed generic or linking claim. Applicant respectfully requests reconsideration of Claims 20-35 and 87. The following remarks and arguments follow the order of the rejections in the Office action.

CLAIM REJECTIONS – 35 U.S.C. §103

Claims 20, 21, 24, 25, 28, 29, 32, 33, and 87

Claims 20, 21, 24, 25, 28, 29, 32, 33, and 87 stand rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 6,925,823 issued to Lifson et al. (hereinafter “Lifson”) and United States Patent No. 5,883,489 issued to Konrad (hereinafter “Konrad”).

Applicant submits on even date herewith a Declaration of Prior Invention under 37 C.F.R. §1.131 signed by the sole inventor of the current application. Applicant submits the Declaration of Prior Invention in order to remove Lifson as a reference. In the Declaration of Prior Invention, the inventor declares that his invention was conceived prior to the October 28, 2003 filing date of Lifson and that the inventor exercised due diligence from the conception date to the filing date of the current application December 8, 2003.

In view of the Declaration of Prior Invention, Applicant respectfully requests withdrawal of the rejection under 35 U.S.C. §103(a) based on Lifson and Konrad.

Claims 22, 23, 26, 27, 30, 31, 34, and 35

Claims 22, 23, 26, 27, 30, 31, 34, and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lifson as modified by Konrad and in further view of United States Patent No. 5,512,883 issued to Lane Jr. (hereinafter “Lane Jr.”).

In view of the Declaration of Prior Invention, Applicant respectfully submits that Lifson is no longer available as the primary reference for the rejection under 35 U.S.C. §103(a). Accordingly, Applicant respectfully requests withdrawal of the rejection under 35 U.S.C. §103(a) based on Lifson, Konrad, and Lane Jr.

Independent Claims 20 and 28

Independent Claims 20 and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent No. 405010270 A issued to Miyamoto et al. (hereinafter “Miyamoto”) and United States Patent No. 5,123,080 issued to Gillett et al. (hereinafter “Gillett”).

Claim 20 specifies “reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the bus current is greater than the limp current limit setting in order to drive the motor in a limp mode; and shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.” Similarly, Claim 28 specifies “reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the line current is less than the programmed threshold in order to drive the motor in a limp mode; and shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.”

Miyamoto teaches a device for preventing an over-load of a pump without stopping a motor “even under the over-load condition.” *Miyamoto*, English Abstract. When an overload condition is detected, Miyamoto teaches reducing the voltage to the motor to remove the overload condition. As the Examiner states on page 7 of the Office action, “[t]he Miyamoto et al. device differs from the claimed invention in that there is no explicit teaching that the motor is shut down.” Accordingly, Miyamoto does not teach or suggest shutting down the motor, as specified by Claims 20 and 28.

Gillett does not cure the deficiencies of Miyamoto. Gillett teaches a drive system for a compressor. The drive system includes safety circuits to shut down a motor in the event of a fault condition. An overcurrent shutdown circuit 36 measures the current to the motor 54 on

lines 64, 66, and 68. The overcurrent shutdown circuit 36 provides an input to a clamp 42 that sets a reset latch 32 when a fault occurs. *Gillett*, col. 5, lines 10-15. More specifically, the overcurrent shutdown circuit 36 measures the current output from a bridge circuit 50 on lines 64, 66, and 68 and provides an output to the reset latch 32 through clamp 42 when an overcurrent condition is detected. This causes the latch 32 to be set. The latch 32 then provides an output to pulse width modulated (PWM) drive circuitry 28, inhibiting its output on line 26 and resulting in the motor 54 being shutdown. *Gillett*, col. 5, lines 28-35. In other words, the drive system of *Gillett* does not teach any attempt to correct the fault condition by driving the motor in a limp mode in order to continue operation of the motor. *Gillett*, col. 5, lines 19-42. Rather, *Gillett* teaches away from Miyamoto. The purpose of the device of Miyamoto is to continue operating the motor at a reduced voltage when a fault occurs. However, *Gillett* teaches always shutting down the motor immediately upon detecting the fault condition. In other words, the goal of Miyamoto is to avoid having to shut down the motor as taught by *Gillett*.

Also, Applicant respectfully traverses the statement on page 7 of the Office action that it was well known “to provide a motor shutdown circuit to protect the motor in extreme cases where the motor power cannot simply [sic] be reduced to resume operation.” Neither Miyamoto nor *Gillett* teach this subject matter, and thus Applicant respectfully requests that the Examiner provide a specific prior art reference that teaches this subject matter.

In addition, Applicant respectfully traverses the following statements on page 8 of the Office action: “It is evident that in PWM of power to a motor that frequency, current, and voltage are proportional to the duty cycle of the PWM. Therefore it follows that in the PWM implementation in Miyamoto et al., as modified by *Gillett* et al., that the reduction in power is achieved by directly or indirectly reducing voltage (see English Abstract) and/or frequency. This operation at reduced power constitutes operation in a limp mode.” Miyamoto does teach lowering the voltage supplied to the motor. *Gillett* does teach providing an output to PWM drive circuitry 28 in order to shutdown the motor 54. One way to lower the voltage to a motor is to alter a PWM drive signal to the motor. However, *Gillett* still teaches away from Miyamoto by teaching that the PWM drive circuitry 28 always shuts down the motor 54 when a fault condition

occurs. The general ability to lower a voltage by altering a PWM signal does not provide the motivation to combine Miyamoto and Gillett. Rather, the motivation to combine must be found in the Miyamoto and Gillett references themselves.

Accordingly, neither Miyamoto nor Gillett, either alone or in combination, teaches or suggests “reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the bus current is greater than the limp current limit setting in order to drive the motor in a limp mode; and shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode,” as specified by Claim 20, or “reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the line current is less than the programmed threshold in order to drive the motor in a limp mode; and shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode,” as specified by Claim 28. In light of the above, independent Claims 20 and 28 and dependent Claims 21-23 and 29-31 are allowable.

Dependent Claims 21-23 and 29-31

Dependent Claims 21 and 29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miyamoto and Gillett. Dependent Claims 22-23 and 30-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miyamoto and Gillett and in further view of Lane Jr. Claims 21-23 and 29-31 depend from independent Claims 20 and 28 and are therefore allowable for the reasons discussed above with respect to Claims 20 and 28. Claims 21-23 and 29-31 also specify additional patentable subject matter not specifically discussed herein.

Independent Claim 87

Independent Claim 87 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Miyamoto and Gillett.

Claim 87 specifies “executing a recovery operation if the parameter is outside of a range, the recovery operation including at least one of generating an updated speed control command, driving the motor in a limp mode, shutting down the motor and then restarting the motor, and

operating the motor in a reverse direction and then operating the motor in a forward direction; and shutting down the motor if the recovery operation fails.”

Miyamoto teaches a device for preventing an over-load of a pump without stopping a motor “even under the over-load condition.” *Miyamoto*, English Abstract. Accordingly, Miyamoto does not teach or suggest shutting down the motor if the recovery operation fails, as specified by Claim 87.

Gillett does not cure the deficiencies of Miyamoto. Gillett teaches a drive system for a compressor. The drive system includes safety circuits, such as an overvoltage/undervoltage shutdown circuit 34 and an overcurrent shutdown circuit 36, to shut down a motor in the event of a fault condition. The overvoltage/undervoltage shutdown circuit 34 measures the voltage output of a rectifier 38, and the overcurrent shutdown circuit 36 measures the current to the motor 54 on lines 64, 66, and 68. The overvoltage/undervoltage shutdown circuit 34 and the overcurrent shutdown circuit 36 each provide an input to a clamp 42 that sets a reset latch 32 when a fault condition occurs. *Gillett*, col. 5, lines 10-15. More specifically, the overvoltage/undervoltage shutdown circuit 34 and the overcurrent shutdown circuit 36 provide an output to the reset latch 32 through clamp 42 when an overvoltage, an undervoltage, or an overcurrent condition is detected. This causes the latch 32 to be set. The latch 32 then provides an output to pulse width modulated (PWM) drive circuitry 28, inhibiting its output on line 26 and resulting in the motor 54 being shutdown. *Gillett*, col. 5, lines 28-35. In other words, the drive system of Gillett does not teach any attempt to correct the fault condition by executing a recovery operation in order to continue operation of the motor. *Gillett*, col. 5, lines 19-42. Rather, Gillett teaches away from Miyamoto. The purpose of the device of Miyamoto is to continue operating the motor at a reduced voltage when a fault occurs. However, Gillett teaches always shutting down the motor immediately upon detecting the fault condition. In other words, the goal of Miyamoto is to avoid having to shut down the motor as taught by Gillett.

Accordingly, neither Miyamoto nor Gillett, either alone or in combination, teaches or suggests “executing a recovery operation if the parameter is outside of a range, the recovery operation including at least one of generating an updated speed control command, driving the

motor in a limp mode, shutting down the motor and then restarting the motor, and operating the motor in a reverse direction and then operating the motor in a forward direction; and shutting down the motor if the recovery operation fails, as specified by Claim 87. Thus, independent Claim 87 is allowable. Applicant also respectfully submits that Claim 87 is generic to withdrawn Claims 9-19, 36-63, and 72-76. Accordingly, Applicant respectfully requests that the Examiner consider reinstating Claims 9-19, 36-63, and 72-76.

Independent Claim 24

Independent Claim 24 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Miyamoto as modified by Gillett and in further view of United States Patent No. 4,912,936 issued to Denpou (hereinafter “Denpou”).

Claim 24 specifies “reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the bus voltage is less than the programmed threshold in order to drive the motor in a limp mode; and shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.”

Miyamoto teaches a device for preventing an over-load of a pump without stopping a motor “even under the over-load condition.” *Miyamoto*, English Abstract. Accordingly, Miyamoto does not teach or suggest shutting down the motor if the recovery operation fails, as specified by Claim 87.

Gillett does not cure the deficiencies of Miyamoto. Gillett teaches a drive system for a compressor. The drive system includes safety circuits, such as an overvoltage/undervoltage shutdown circuit 34, to shut down a motor in the event of a fault condition. The overvoltage/undervoltage shutdown circuit 34 measures the voltage output of a rectifier 38. The overvoltage/undervoltage shutdown circuit 34 provides an input to a clamp 42 that sets a reset latch 32 when a fault condition occurs. *Gillett*, col. 5, lines 10-15. More specifically, the overvoltage/undervoltage shutdown circuit 34 provides an output to the reset latch 32 through clamp 42 when an overvoltage, an undervoltage, or an overcurrent condition is detected. This causes the latch 32 to be set. The latch 32 then provides an output to pulse width modulated

(PWM) drive circuitry 28, inhibiting its output on line 26 and resulting in the motor 54 being shutdown. *Gillett*, col. 5, lines 28-35. In other words, the drive system of Gillett does not teach any attempt to correct the fault condition by executing a recovery operation in order to continue operation of the motor. *Gillett*, col. 5, lines 19-42. Rather, Gillett teaches away from Miyamoto. The purpose of the device of Miyamoto is to continue operating the motor at a reduced voltage when a fault occurs. However, Gillett teaches always shutting down the motor immediately upon detecting the fault condition. In other words, the goal of Miyamoto is to avoid having to shut down the motor as taught by Gillett.

As the Examiner states on page 10 of the Office action, Miyamoto as modified by Gillett “differs from the claimed invention in that there is no teaching of the voltage detected being compared to a voltage threshold.” Denpou does not cure the deficiencies of Miyamoto and Gillett. Denpou teaches a compressor starting condition detecting device that detects a voltage, which is fed to the compressor by a power supply. *Denpou*, Abstract, lines 16-19. Denpou also teaches that the voltage is compared with a predetermined voltage. *Denpou*, col. 1, lines 58-60. Despite this comparison to a predetermined voltage, the Abstract of Denpou specifically points out that “[w]hen a compressor starting failure is detected, the compressor halting device halts the compressor immediately.” *Denpou*, Abstract, lines 19-21. In other words, Denpou teaches that the compressor is always shutdown (or not allowed to start) when the voltage is less than a threshold. Thus, Denpou teaches away from Miyamoto in the exact same way that Gillett teaches away from Miyamoto.

In addition, Applicant respectfully traverses the following statements on pages 10-11 of the Office action: “As the applicant has presented various alternatives of parameters measured (current, voltage, and temperature), it is evident that the particular parameter measured is not a critical or central aspect of the claimed invention, and that the control methods using different parameters are functionally equivalent. The applicant has not provided an indication why a particular parameter is critical, or unexpectedly advantageous over another.” Applicant respectfully submits that the various alternatives of parameters measured are not necessarily functionally equivalent. Also, Applicant is not required to indicate why a particular parameter is

critical. Rather, Applicant is only required to present claims that define over the prior art. Thus, Applicant has presented various independent claims of differing scope that define the measurement of particular parameters in order to operate a motor of a pump, with each of these independent claims individually defining over the prior art.

Accordingly, Miyamoto, Gillett, and Denpou, either alone or in combination, do not teach or suggest “reducing at least one of an output voltage provided to the motor and an operating frequency of the motor if the bus voltage is less than the programmed threshold in order to drive the motor in a limp mode; and shutting down the motor if the motor does not operate within operational limits while being driven in the limp mode.” Thus, independent Claim 24 and dependent Claims 25-27 are allowable.

Dependent Claims 25-27

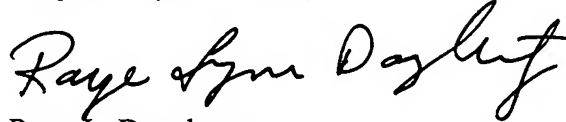
Dependent Claim 25 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Miyamoto as modified by Gillett and in further view of Denpou. Dependent Claims 26 and 27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miyamoto as modified by Gillett and Denpou and in further view of Lane Jr. Claims 25-27 depend from independent Claim 24 and are therefore allowable for the reasons discussed above with respect to Claim 24. Claims 25-27 also specify additional patentable subject matter not specifically discussed herein.

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CONCLUSION

In light of the above, Applicant respectfully requests reconsideration, reinstatement, and allowance of pending Claims 9-63, 72-76, and 87.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Raye L. Daugherty". The signature is fluid and cursive, with the first name "Raye" being prominent.

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